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1912/13

REPORTS

OF THE

VISITING COMMITTEES OF THE BOARD OF OVERSEERS

OF

HARVARD COLLEGE

FOR THE ACADEMIC YEAR 1912–13

CAMBRIDGE, MASS.
Published by the University
1913

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In Board of Overseers
May 12, 1909

Voted, — That the Secretary of the Board be directed to print each year, under Section 31 of the Rules and By-Laws of the Board, a sufficient number of volumes, containing the Reports of the Visiting Committees, to supply the members of the Corporation and of the Board of Overseers.

Attest.

Winthrop H. Wade,
Secretary.

COMMITTEES APPOINTED BY THE BOARD OF OVERSEERS

1912-13

ON ELECTIONS

THEODORE ROOSEVELT,
HENRY CABOT LODGE,
GEORGE VON LENGERKE MEYER,
WILLIAM RAND, Jr.,
AUGUSTUS E. WILLSON.

ON REPORTS AND RESOLUTIONS

MOSES WILLIAMS,
ROBERT S. PEABODY,
LAWRENCE E. SEXTON,
ROBERT GRANT,
LOUIS A. FROTHINGHAM,
GEORGE WIGGLESWORTH,
J. PIERPONT MORGAN, Jr.

ON UNIVERSITY EXTENSION, INCLUDING THE SUMMER SCHOOL OF ARTS AND SCIENCES AND THE SCHOOL FOR SOCIAL WORKERS

CHARLES W. ELIOT,
WILLIAM L. RICHARDSON,
JEROME D. GREENE,
HENRY CABOT LODGE,
ABBOT L. MILLS,
J. COLLINS WARREN,
GEORGE A. GORDON.

ON DEPARTMENTS

To visit the Divinity School

GEORGE A. GORDON,
JAMES DENORMANDIE,
FRANCIS H. ROWLEY,
CHARLES E. PARK,
PAUL REVERE FROTHINGHAM,
JOHN A. BELLOWS,
AUGUSTUS M. LORD,
CHARLES L. NOYES,
HENRY W. FOOTE.

To visit the Law School

ROBERT GRANT,
CHARLES E. HUGHES,
CHANDLER P. ANDERSON,
WILLIAM RAND, Jr.,
LOUIS D. BRANDEIS,
JOSEPH B. WARNER,
FRANCIS J. SWAYZE,
CHARLES P. GREENOUGH.

To visit the Medical and Dental Schools

J. COLLINS WARREN,
GEORGE B. SHATTUCK,
CHARLES W. ELIOT,
ALEXANDER COCHRANE,
WILLIAM STURGIS BIGELOW,
HENRY H. SPRAGUE,
HENRY SALTONSTALL HOWE,
WILLIAM L. RICHARDSON,
CHARLES P. BRIGGS,
JAMES C. WHITE,
CHARLES H. TWEED.

To visit the Bussey Institution

CARROLL DUNHAM,
WALTER C. BAYLIES,
J. ARTHUR BEEBE,
JOHN LOWELL,
NATHANIEL T. KIDDER,
AUGUSTIN H. PARKER,
WILLIAM H. RUDDICK,
ISAAC S. WHITING,
SIMON FLEXNER,
DANIEL W. FIELD,
WARREN A. REED.

To visit the Library

Francis R. Appleton,
J. Pierpont Morgan, Jr.,
Henry Saltonstall Howe,
William Phillips,
Clement W. Andrews,
Charles C. Soule,
William McI. Elkins,
Edward D. Brandegee,
Charles K. Bolton,
J. Hays Gardiner,
Alexander Cochrane,
C. Chauncey Stillman.

To visit the Observatory

Joel H. Metcalf,
George I. Alden,
Anna P. Draper (Mrs. Henry Draper),
Edwin Ginn,
George R. Agassiz,
Elihu Thomson,
Erasmus D. Leavitt,
Charles F. Choate, Jr.,
Charles R. Cross.

To visit the Botanic Garden

Nathaniel C. Nash,
Oliver Ames,
Edwin F. Atkins,
Arthur F. Estabrook,
George B. Dorr,
Ernest B. Dane.

To visit the Gray Herbarium

William Endicott, Jr.,
George G. Kennedy,
Nathaniel T. Kidder,
Emile F. Williams,
Walter Deane,
George R. White,
John E. Thayer,
Joseph R. Leeson,
Susan Minns (Miss),
Mrs. William G. Weld,
Katharine P. Loring (Miss).

To visit the Museum of Comparative Zoölogy

J. Collins Warren,
George P. Gardner,
Dudley L. Pickman,
Rodolphe L. Agassiz,
John C. Phillips,
J. B. Henderson, Jr.,
Louis J. de Milhau.

To visit the Peabody Museum

George D. Markham,
Charles P. Bowditch,
Augustus Hemenway,
Jesse W. Fewkes,
Clarence J. Blake,
Clarence B. Moore,
Elliot C. Lee,
Louis J. de Milhau,
John C. Phillips,
Thomas Barbour,
Robert G. Fuller.

To visit the Germanic Museum

Hugo Reisinger,
William Endicott, Jr.,
Edward D. Adams,
Clement S. Houghton,
David P. Kimball,
Edward R. Warren.

To visit the Botanical Museum

Nathaniel C. Nash,
Walter Hunnewell,
Elliot C. Lee,
David Pingree,
H. Clifford Gallagher,
Mary Lee Ware (Miss),
William Powell Wilson,
Benjamin Preston Clark,
Stephen P. Sharples.

To visit the Arnold Arboretum

William A. Gaston,
Walter Hunnewell,
Charles E. Stratton,
Mary S. Ames (Miss),
Abby A. Bradley (Miss),
John Lowell,
John E. Thayer,
Frank G. Webster,
Charles A. Stone,
Herbert Parker,
Bayard Thayer,
William C. Endicott.

To visit the Semitic Museum and Division of Semitic Languages and History

Jacob H. Schiff,
George Wigglesworth,
Jesse Isidor Straus,
David A. Ellis,
William Merriam Crane.

To visit the Fogg Museum and the Department of Fine Arts

J. Templeman Coolidge, Jr.,
Bernhard Berenson,
Arthur Fairbanks,
J. Randolph Coolidge, Jr.,
Alfred A. Pope,
Paul J. Sachs,
Mrs. J. Montgomery Sears,
Edward W. Emerson,
George N. Black.

To visit the Graduate School of Arts and Sciences

Frederic A. Delano,
Henry Cabot Lodge,
Stratton D. Brooks,
Gardiner M. Lane,
Charles P. Bowditch,
Owen Wister,
Edward Robinson,
Arthur A. Noyes,
Francis B. Gummere,
William Preston Few,
William K. Richardson.

To visit the Graduate School of Applied Science

Eliot Wadsworth,
James J. Myers,
Frederick P. Fish,
Herbert C. Leeds,
John Lawrence,
Odin Roberts,
Franklin Remington,
Robert F. Herrick,
Ernest B. Dane,
Philip Stockton,
Edgar H. Wells,
George C. Kimball.

To visit the Graduate School of Business Administration

Howard Elliott,
J. Pierpont Morgan, Jr.,
Thomas W. Lamont,
George D. Markham,
Charles W. Eliot,
William C. Boyden,
John S. Lawrence,
Charles H. Jones,
A. Shuman,
Walter C. Baylies,
Jerome D. Greene,
James F. Curtis,
Adams D. Claflin.

To visit the Jefferson Physical Laboratory and Department of Physics

Howard Elliott,
Elihu Thomson,
Erasmus D. Leavitt,
Elliot C. Lee,
Samuel Hill,
Hammond Vinton Hayes.

To visit the Chemical Laboratory

J. Collins Warren,
Clifford Richardson,
Elihu Thomson,
Morris Loeb,
Charles H. W. Foster,
John D. Pennock,
Alexander Forbes.

To visit the Stillman Infirmary

Clarence J. Blake,
J. Collins Warren,
Augustus Hemenway,
George B. Shattuck,
James A. Stillman,
Herbert B. Howard,
Edmund H. Stevens,
William L. Mowll,
James Purdon.

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J. Wells Farley,
William S. Hall,
Evert J. Wendell,
Edward D. Brandegee,
William Hooper,
Clarence J. Blake,
Samuel H. Durgin.

ON THE ADMINISTRATION OF THE UNIVERSITY CHAPEL

George Wigglesworth,
George A. Gordon,
William Lawrence,
Paul R. Frothingham,
Samuel M. Crothers,
Roland W. Boyden,
William DeWitt Hyde.

ON THE RELATION OF THE UNIVERSITY TO SECONDARY SCHOOLS

Jerome D. Greene,
George Wigglesworth,
John Goddard Hart,
Frederick P. Fish,
William Bennett Munro,
Edgar H. Wells,
Alfred Ernest Stearns,
William Orr,
George P. Hitchcock.

ON THE TREASURER'S ACCOUNTS

Francis L. Higginson,
William Endicott, Jr.,
William A. Gaston,
William C. Endicott,
Grafton St.L. Abbott,
Allan Forbes,
Arthur Lyman,
Richard C. Storey,
John L. Saltonstall.

FOR THE COLLEGE

ON GOVERNMENT

Charles W. Eliot,
William Lawrence,
Theodore Roosevelt,
William A. Gaston,
William C. Boyden,
William Endicott, Jr.,
William L. Richardson.

FOR THE COURSES OF INSTRUCTION

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A. V. Williams Jackson,
Percival Lowell,
Paul Elmer More.

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M. A. DeWolfe Howe,
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Chauncey G. Parker.

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James Monroe Olmstead,
George Francis Arnold,
Edward Ruhl.

ON FRENCH

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T. Russell Sullivan,
Gordon Abbott,
Francis McLennan,
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J. Randolph Coolidge, Jr.,
James Geddes, Jr.,
William R. Thayer,
William B. de las Casas.

ON HISTORY

James Ford Rhodes,
William R. Thayer,
Worthington C. Ford,
Henry H. Edes,
William F. Wharton,
Charles P. Greenough,
Oswald G. Villard.

ON GOVERNMENT

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Abbot L. Mills,
Charles S. Hamlin,
William Phillips,
F. Sumner Mead,
Samuel W. McCall,
Augustus E. Willson,
Frank G. Thomson,
Thomas L. Livermore.

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Charles W. Eliot,
John W. Morss,
I. Tucker Burr,
William Endicott, Jr.,
Robert Treat Paine (Class of 1888),
Camillus G. Kidder.

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Walter Deane,
Edward L. Rand.

ON ZOÖLOGY

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Augustus Hemenway,
William Brewster,
Alexander Forbes,
John E. Thayer,
Dudley L. Pickman,
Francis N. Balch,
John C. Phillips.

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Rodolphe L. Agassiz,
George P. Gardner,
William E. C. Eustis,
Raphael Pumpelly,
William Sturgis Bigelow.

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John Hays Hammond,
Charles P. Perin,
R. A. F. Penrose,
Quincy A. Shaw,
Frank H. Taylor,
Edgar C. Felton,
Hennen Jennings,
Benjamin B. Thayer,
Albert F. Holden.

ON FORESTRY

Frederick L. Olmsted,
Theodore Roosevelt,
John S. Ames,
James S. Russell,
Frederick J. Caulkins,
John E. Thayer,
George C. Cutler,
Henry James, Jr.,
Warner R. Butler.

ON PROGRAMMES OF STUDY IN HARVARD COLLEGE

Charles W. Eliot,
Jerome D. Greene,
William Lawrence,
William L. Richardson,
William Rand, Jr.

No. 38.

REPORT OF THE COMMITTEE TO VISIT THE ASTRONOMICAL OBSERVATORY.

To the Board of Overseers of Harvard College: —

The undersigned committee entrusted with the pleasant duty of visiting the Harvard Astronomical Observatory beg leave to report as follows: —

They have visited the Observatory as a committee twice during the year, have familiarized themselves with its work and have received from the Director full reports of its condition and progress.

The institution, one of the largest and best equipped in the world, is carrying on a great variety of investigations in many different branches of Astronomical research.

At the present time no less than forty-one researches are in progress.

In the report which the committee made to your honorable body last year, a summary of the work already completed and published in the Annals of the Observatory was given.

In the present report, your committee desire to limit themselves to some facts in relation to one particular line of investigation, — the Classification of the Stars according to their type of spectrum. As pointed out in our last report the Harvard Observatory has been a pioneer in this branch of Astrophysics, developing the science largely by the photographic method in the face of much opposition and criticism. But in no direction has the scientific faith of Professor Pickering proved more prophetic than in the valuable results obtained in this sphere of investigation.

Auguste Comte, the great French positivist, predicted that humanity must limit itself to knowledge of the solar system, and the Sidereal regions would be forever beyond its intellectual powers.

The invention of the spectroscope and its application to Astronomy has shown the futility of prophesying limitations. Today through it we know the chemistry and physical conditions of the stars, better than we know that of the interior of the Earth.

In May, 1885, Professor Pickering began the use of the objective prism to photograph the spectra of the stars.

As the name implies, the instrument consists of a large prism, placed in front of a photographic telescope, by which a photograph of

the spectra of the stars, and not of the stars themselves, is obtained. This method has some limitations but it has two great excellences, — first, by it the spectra of many stars can be obtained simultaneously, and second, because of the usual short dispersion and small loss of light, images of the spectra of very faint stars are obtained; thus giving, with a minimum of labor, material from which much information as to the spectral type of even the faint stars may be acquired. The simplicity of the method in no way limits its accuracy.

The astronomers who use the largest refractors, with slit spectroscopes attached, all testify to the accuracy of the classification based upon plates taken with an astronomical doublet and an objective prism. The results of the use of the objective prism spectroscope are found in the great number of spectrum plates, estimated at forty thousand, which now exist in the photographic library at Harvard. From this material Mrs. Williamina P. Fleming discovered many new variable stars, identified as such by their characteristic bright line spectra. A catalogue of stars having peculiar spectra has been recently published in the Harvard Annals. But, most valuable of all, these plates have been used as a basis for the Draper Memorial Catalogue, which gives the spectra of the brighter stars of the sky following a notation originated at the Observatory, and called the Draper Classification.

In the beginning this classification was empirical, based entirely upon apparent differences in the light of the stars, and for all the observers knew not representative of any specially significant differences in the stars themselves, but as the years have passed, and wider knowledge has been brought to the problem, it has become more and more evident that the classification is in fact based upon physical differences in the stars, that, in reality, separate them into families.

Among the astronomical events of recent years, none are more gratifying to the friends of the Observatory than the almost universal acceptance of the Draper Classification. In connection with the International Solar Union held at Mount Wilson in September, 1910, where the largest and most representative gathering of the Astronomers of the world took place, it was voted unanimously to extend the scope of the Union to include general Astrophysics, and among its first acts was the appointment of a Committee on the Classification of Stellar Spectra. This Committee opened correspondence with the Astrophysicists of the World, and the results of their investigation are given in the Astrophysical Journal of April, 1911.

The replies are quite extensive and in detail, and therefore cannot be given here. Enough for our purpose to mention that the signifi-

cant and gratifying result was brought out, that not only did almost all the Astronomers approve of the Draper Classification, but that it was in practical use generally, so that any future improvement must grow out of and be based upon that Classification.

Another significant event in this connection took place at the recent International Conference of the Superintendents of the Nautical Almanacs of the World, when they adopted the following resolution : —

" The Conference decides that the names of stars shall be accompanied by a letter indicating their Spectral type, in terms of Pickering's notation. It is of the opinion that these indications (so far as they have been determined) shall in the future be given to the list of 3064 stars to be published by the Bureau des Longitudes."

The wide interest of the astronomical world in this subject is shown by the multitude of calls made upon the Observatory for information in regard to the classification of particular stars.

The photographic library gives the basis from which the expert knowledge of the Observatory can furnish the information desired. During the past year more than 400 stars have been classified at the solicitation of some of the principal observatories in the United States, England, France, Italy, and Germany.

This fact shows that others of the great observatories of the world are entering into this line of investigation which has already accomplished so much and which promises so much more in the future. The " Old Astronomy " was content to determine the positions of the heavenly bodies, with no regard for their physical characteristics. From this age-long investigation, the researches on the proper motions of the so-called fixed stars are bearing wonderful fruit. Through the aid of the Carnegie Institution Professor Boss of Albany has obtained some very striking results. From these investigations and others for the determination of motion in the line of sight, a most striking and unexpected fact is emerging, namely, that the average proper motion of the stars is a function of their spectral type, that some classes of these bodies are comparatively near us and others at a very great distance.

In this and in other ways the paramount importance of the Classification of the Stars according to their Spectra is asserting itself, and the extension of the work to include a knowledge of the fainter stars is demanded.

To meet this demand the Observatory has undertaken a Revised Draper Catalogue, which will carry this information to stars as faint as the ninth magnitude and contain upwards of 100,000 stars.

In this connection it is a pleasure for the committee to speak of the admirable work of Miss Annie J. Cannon. At the present time she is the one person in the world who can do this work quickly and accurately. Through familiarity with it she has acquired such a perfect mental picture not only of the general types, but of their minute subdivisions, that she is able to classify the stars from a spectrum plate instantly upon inspection without any comparison with photographs of the typical stars. This gives her great speed in classification amounting to no less than 300 stars an hour. Certainly a wonderful performance. The amount of work therefore which she is able to accomplish in stellar classification is only limited by the number of helpers at her disposal to do the less expert work of identification and reduction. At the same time her great speed in no way limits the accuracy of her estimates. From an investigation of her probable error based upon parts of the sky where she has made independent duplicate estimates, it is found that her average deviation amounts to only one tenth of a unit.

Miss Cannon by virtue of her unique skill in this branch of science is doing so much for Modern Astronomy and bringing such credit to the Observatory that she deserves official recognition which she has not received. It is an anomaly that though she is recognized the world over as the greatest living expert in this line of investigation, and her services to the Observatory are so important, yet she holds no official position in the University. At present as her appointment is by the Observatory, and not by the University, her name does not appear in the Catalogue or other official publications of the University. It is the unanimous opinion of the Visiting Committee that the University would be honoring itself and doing a simple act of justice to confer upon her an official position which would be a recognition of her scientific attainments.

The Revised Draper Catalogue of which we have spoken will require four or five years to complete, and when finished will fill four or more volumes of the Annals.

In this work is seen a good illustration of the use of division of labor and scientific efficiency applied to Astronomical research. The great word in the commercial industries of today is efficiency. Universities and colleges have recently been criticised for their lack of it, but here in the work of the Observatory we find it present in a very developed form. By using the scientific expert to do only that part of the work which requires the greatest skill, and leaving the laborious and more mechanical work to assistants who are equally capable for the particular work they are called upon to do, but which

does not require such expert knowledge, the output of results is multiplied greatly. Thus the highest standard of excellence is retained and the results greatly increased by the expenditure of a comparatively small amount of money. The application of business efficiency will permit the completion of the Revised Draper Catalogue with economy and speed and in accord with the highest standards of Science.

Again, the Visiting Committee would refer to the investigation of the character of the spectra of the stars as an illustration of the right policy for a large observatory to pursue, to take some well chosen field of investigation and carry it on until it becomes an authority in that field. The work which has been carried on for twenty-seven years at the Harvard Observatory since the objective prism was first used has borne good fruit, and the Observatory today is the one authority in the world in this special field of research. But the end is not yet. The work has only now proved its importance and the questions which have been answered have raised others and larger ones which must be answered, and can be answered only at Harvard, by a continuation of the work. Here is a settled policy which has been consistently followed for more than a quarter of a century, and the Observatory holds a well-earned authority because of it. It would therefore be a backward step both for the Observatory and for the Science of Astronomy if there should be any abandonment of this work or the Observatory should lose its well-earned preëminence. There are many evident signs that other observatories would like to win laurels in this field, and to all such we certainly wish success, for no one has a right to seek or claim a monopoly of any branch of science, but certainly it is the duty of all friends of the Observatory and Harvard College to support the Director in this great investigation, to encourage him to continue the maintenance and development of that policy which has already been followed for so many years and with such signal success, and to assure him the financial support in this and in other lines which is necessary to carry on such large investigations.

In conclusion it is not for us to speak in detail of the work of Professor Pickering, which has made the Observatory what it is today, a leading one of the world. We would, however, like to chronicle the great honor which has come to him and through him to the University.

At the Meeting of the American Association for the Advancement of Science, held in Washington during the last days of the year 1911, he was elected its President. This distinguished honor coming to

him when he was not even aware that his name had been presented as a candidate, is the most eloquent testimony we can have of the honorable position which the Director and the Observatory occupy in the Scientific World.

JOEL H. METCALF, *Chairman*,
GEORGE I. ALDEN,
GEORGE R. AGASSIZ,
CHARLES F. CHOATE, JR.,
CHARLES R. CROSS,
MRS. ANNA P. DRAPER,
EDWIN GINN,
ERASMUS D. LEAVITT,
ELIHU THOMSON.

OCTOBER 9, 1912.

No 39

REPORT OF THE COMMITTEE TO VISIT THE GRAY HERBARIUM

To the Board of Overseers of Harvard College: —

During the period since its last report the Committee appointed to visit the Gray Herbarium have met two or three times each year. The first of these meetings has commonly been in January or February and has been held at the Herbarium, where the Committee have listened to a detailed report by the Curator upon the condition of the collections, extent of the accessions, development of the library of the Herbarium, changes of the staff, nature of the monographic activities, field exploration, determinative work, and publication. A second and sometimes a third meeting have been held, usually in Boston during May or June, to consider resources and accounts, acknowledge important gifts, and give counsel when requested by the Curator. These meetings have been attended by about two-thirds or three-fourths of the members of the Committee. Most of the members have also personally visited the Herbarium at other times and have had all desired facilities to acquaint themselves with the personnel of the staff, management of the collections, and nature of the scientific work.

Each year to assist the Herbarium the Committee have endorsed an annual circular, presenting as briefly as possible the nature of the collections, their high scientific value, the practical as well as theoretical aspects of the work done by the staff, and asking for voluntary donations of ten dollars or more for the purpose of giving to the staff the power of further undertakings, especially in the way of exploration and publication, than could be accomplished by means of the regular income of the establishment. These circulars have met with prompt and courteous response from a considerable number of persons, the amounts received having varied from $1,400 to $2,000. These sums, supplementing the regular income, have in several instances been of crucial value in permitting the successful completion of exploring expeditions to remote and little investigated fields.

In connection with the field-work directed from the Gray Herbarium, special tribute should be paid to the late Cyrus Guernsey

Pringle, for more than twenty-five years associated with the Herbarium as its expert collector. During this period Mr. Pringle made over twenty exploring expeditions to the wilder and less known portions of Mexico. Frugal in his personal habits, inured to hardships, and tactful with the hostile Indians, he possessed the admirable adjustment of courage and caution which made it possible for him to penetrate far from civilization and secure for Harvard many hundred species of plants new to science.

The Committee would also call attention to the interest and value of the extensive field-work accomplished in recent years in the maritime provinces of Canada, Newfoundland, and Labrador, by Professor Fernald of the Herbarium staff. The bibliographical work of the Librarian, Miss Day, is also noteworthy for its extent and scientific value, and perhaps especially from the fact that it has become a financial asset to the Herbarium.

About four years ago, when the old building of the Herbarium had become dangerously congested and when various efforts to secure funds for an entirely new structure had proved unsuccessful, the Curator presented a plan for a gradual reconstruction, and enlargement, a section at a time, of the old building. After careful consideration this project met with the full approval of the Committee. As a first step, a thoroughly fireproof wing, the gift of Mr. Nathaniel T. Kidder, long a member of the Committee, capable of holding about half the present plant collection, was added toward the northwest, being, it is believed, one of the most perfect structures for its particular purpose ever built. This was followed two years later by the complete rebuilding and considerable enlargement of the two lateral wings of the building. One of them, the gift of a donor who wishes to be anonymous, provides ample and well equipped quarters for the library of the Herbarium. The other wing, the gift of Mr. George Robert White, who has been for many years a member of the Committee, contains two admirable laboratories, fully equipped for the classes in systematic botany.

A fourth improvement, namely, the reconstruction of the front portion of the original central section of the building, is now in advanced progress as the result of a recent anonymous gift for the purpose. In all these separate building enterprises unity of plan has been carefully maintained, so that the building, when completed, will possess harmonious architectural character, as well as great safety and convenience throughout.

The Committee are glad of this opportunity to recognize the invaluable services which have made possible the extension and

development of the Herbarium. The painstaking ability of Professor Robinson in planning the new structure to the minutest detail has impressed the Committee very strongly. No architect alone could have planned for the multitudinous requirements of an herbarium building and have produced results so satisfactory.

A new policy worthy of mention has been adopted by the Curator in placing a large and admirably equipped room in the second story of the George Robert White Laboratories at the disposal of the New England Botanical Club for their extensive and valuable local herbarium. This matter was taken up with the Committee, who fully concurred in believing it a wise measure for the mutual benefit of the Gray Herbarium and the active scientific society engaged in allied work. There can be no doubt that the presence of the collections of the New England Botanical Club in the building of the Gray Herbarium will make the establishment in still higher degree the resort of scholarly persons, both professional and amateur, who are seriously interested in the study of systematic botany.

The chief need of the Gray Herbarium is a somewhat larger staff. The places of Dr. J. M. Greenman, who was some years ago called to the Field Museum of Natural History in Chicago, and of Mr. H. H. Bartlett, more recently called to service in the United States Department of Agriculture, have not been filled, and in consequence much time-consuming determinative work and incidental correspondence fall upon Professors Robinson and Fernald, which seriously interrupt their more scientific activities. When the rebuilding of the Herbarium, now well advanced, has been completed and the invaluable collections are in thoroughly safe quarters, it will be possible to determine more accurately the cost of maintenance of the enlarged building, and it is hoped that a balance of income may permit some increase of the staff. This is the more important from the fact that it would be difficult to replace the present experienced members of the staff, and consequently the training of promising understudies should be begun without undue delay.

Respectfully submitted for the Committee,

WILLIAM ENDICOTT, Jr., *Chairman.*
EMILE F. WILLIAMS, *Secretary.*

January 8, 1913.

No. 40

REPORT OF THE COMMITTEE ON GEOLOGY, MINERALOGY, AND PETROGRAPHY

To the Board of Overseers of Harvard College: —

Your Committee on Geology, Mineralogy, and Petrography begs to submit its report for the current academic year.

In our last report we called attention to the importance of securing a Professor of Geology, knowing that the matter was under consideration, and we are pleased to learn that the Sturgis Hooper Professorship of Geology is now held by R. A. Daly, Ph.D., recently with the Massachusetts Institute of Technology. He was instructor in Geology at Harvard in the years when that department was conducted most efficiently. The Committee believes that his association will vitalize it and shortly make it one of the most important departments. The appointment of W. W. Atwood as Professor of Physiography and the advancement of L. C. Graton to a full professorship, with increased lectures, will add strong and able men to rehabilitate the department.

Few seem to realize that there has been a withdrawal or diminution of courses offered of over twenty-five per cent between what is given now and what was given ten years ago. This is a showing which will hardly bring satisfaction to those of us who want to believe that Harvard is keeping abreast of requirements. Geology is a broader field of learning today than ever before and it offers increasing opportunities to young men for successful careers, not only in pure geology, but especially in economic geology, which deals with the fertilizer, clay, oil and gas industries.

At the present time negotiations are under way for a broad coöperation, which means co-instruction, between the Massachusetts Institute of Technology and Harvard. In no department will this be more helpful than in Geology. The two institutions will necessarily each have elementary courses, and then one will retain certain advanced courses and the other will give other subjects. The Committee is heartily in favor of the plan, and the working out of details can be safely left to those who will have the matter in hand.

We find that the heads of departments are losing or wasting valuable time by being compelled to do much work which ought and could be done by a secretary, and the matter is respectfully submitted for your attention to the end that men of training and abilities may use these wholly in fields where the most will be accomplished.

Further, we recommend that your consideration be given to developing the work of the department by establishing an Instructorship in Geology by the expenditure of something less than one thousand dollars for the geological cabinet and by aiding the Whitney Library to the extent of five hundred dollars yearly in order that it may be kept thoroughly up to date.

In common with other museums of the College there is a real demand that it be kept open seven days a week, for the number who visit it is surprisingly large.

We feel the loss of Professor Rotch deeply and we appreciate the continuance of the Blue Hill Observatory work by Mrs. Rotch under the direction of Professor Ward. The importance of the study of the air and air currents is increasing as we look forward to the more general use of flying machines in war and peace. Harvard should maintain its lead in such investigations.

Finally, a beginning has been made towards bringing the department back to its proper place, but we would emphatically state that much is yet to be done and that your assistance will be needed in council and funds if the department is to become what it should be, from the standpoint of the undergraduate seeking instruction or from the standpoint of the graduate who wants to feel that in fields which it attempts to cover, the curriculum at Harvard is second to that of no other university.

Respectfully submitted,

GEORGE B. LEIGHTON, *Chairman*,
WM. STURGIS BIGELOW,
R. L. AGASSIZ,
GEORGE P. GARDNER.

February 26, 1913.

No. 41

REPORT OF THE COMMITTEE ON HISTORY

To the Board of Overseers of Harvard College: —

Several years have been allowed to pass since the last report of the Committee made in December, 1903. This has not been due to any lack of interest on our part but has resulted to a great extent from the fact that there were few if any suggestions which we had in mind to present which had not been already incorporated in our previous reports.

The field of the Committee has been broadened within the last few years, and instead of there being several committees to whom were assigned different periods of history, the entire subject of history is now assigned to one committee, the subject of International law and Roman law having been placed in other hands.

We have held interesting meetings and enjoyed instructive talks with the members of the Department of History. Their interest in their work is inspiring and their zeal to make theirs one of the strongest departments in the University meets with our warmest sympathy. Their enthusiasm is contagious and even those of us who are not historical experts, so to speak, and have little or no experience in teaching, are stimulated by the atmosphere of learning and research which they create about them.

Some of us have attended the different historical courses and listened to the lectures and instruction given with much interest. Each lecturer has his own method of instruction, and we do not feel called upon to offer any suggestions as to the manner of conducting the courses. This is a matter which properly falls within the jurisdiction of the authorities of the University. The success or failure of the lecturer or instructor is quickly gauged by the attendance at his courses and by the interest which he infuses into his pupils, unless of course his subject be one which is of such abstruse learning or of such special knowledge that it is naturally attended by few students other than those who are specializing in that direction. Those of the Governing Boards of the University who are immediately in touch with the daily working of the college

curriculum must necessarily be the most competent judges of the best methods of teaching and of the personal influence of the teacher, and to them we believe such matters can safely be left.

We have dwelt in our earlier reports upon the fact that we deemed a thorough general knowledge of modern history to be of great value to every educated man, no matter what might eventually be his chosen career in life, and we have further stated that in our opinion the aim of the University should be as far as possible to give to the undergraduate as thorough a general knowledge of history as is possible, letting such specialization as may be eventually desired come later in the graduate school or elsewhere. This position we wish to emphasize now again. In our conferences with the members of the Department of History the subject of specialization has been discussed quite extensively, and we have had the benefit of the advice and experience of learned professors from foreign universities, in some of which specialization is largely encouraged and where its results are perhaps better known than here.

The specific needs of the Department of History are the same, we imagine, as those of most of the departments of the University,— more money, more professors and instructors, enlargement of the field of instruction, improvement in the quality of work done by assistants, larger accommodations in the way of rooms in and about the College Yard for conference, and more facilities generally for research and study by the teacher and students in the library. These needs have all been pointed out in the earlier reports of the committees who have had to deal with questions affecting the Department of History and we desire to refer to what has been already said upon these subjects in those reports and to emphasize again our hope that these needs will not be lost sight of, and that from time to time as the opportunity occurs they will be gradually satisfied.

Upon these subjects the Chairman of the Department of History, Professor R. B. Merriman, speaking for the members of the Department, writes in referring to the possible rearrangement of its courses, " any new plans which we may make in order to be effective will demand a very considerable improvement in the quality of work done by our assistants; whether that improvement is to be accomplished by an increase in the number of our assistants or by getting a better grade of men, we do not know, but I think that the Department is unanimous in the opinion that one of the greatest needs is betterment in this particular." In referring to " the inadequacy of its (the Department's) teaching in certain

modern and important fields, of which Latin America and the far East are perhaps the most important ones, he says, " I think I am perfectly correct in stating that we are the only large University in the country which does not offer considerable instruction in these two fields. Yale, for instance, has two professors devoting their time to modern Asiatic history and one to the history of Latin America. Columbia, Michigan, California and Illinois all deal far more thoroughly than it is possible for us to do with one or both of these fields " ; and again, " of all our force only two professors, three assistant professors and one instructor are giving their time exclusively to the teaching of history. All the rest are partially drawn off into other departments or administrative work. Our departmental force is certainly not larger, really not as large, as that of the corresponding departments in Yale and Columbia, and the variety of instruction which we are able to offer compares still less favorably with that afforded by the larger European universities."

In connection with the above reference to the needs of better accommodations and greater facilities in the library, it is interesting to note what President Lowell said on March 14,1912, at the annual meeting of the Harvard Club of Boston, upon this subject, "Then there is the library, where we have the finest collection of books in the country housed in a building that is not fireproof; and you will remember that once before the whole library of Harvard was destroyed by a fire in Harvard Hall. The present building, moreover, is so crowded that seventy thousand books have to be stored in the basement of adjoining buildings. There is no proper place for professors or advanced students to work among the shelves, and if we do not get a better building soon this powerful magnet which attracts teachers and students to the University will become incapable of use." There is no class of students which make a larger use of the library than those who are pursuing the courses in history. Probably no class have felt the insufficiency of the present accommodations more than the professors, teachers and students of the Department of History. We are glad to say that through the generosity of Mrs. Widener this want which has been the subject of much discussion at our meetings is being supplied.

We assume that this report is one of many relating to other departments of the University all calling for assistance and relief in much the same directions or in others equally important, and that the suggestions contained in it are presented, so far as the government of the University is concerned, to sympathetic ears.

The authorities of the University are indeed already fully conversant with the needs of the Department of History, of which the present President was long a leading member, and if they were in a position to do so would quickly comply with its demands and satisfy its needs. It is rather to the friends of the University outside of those who from their relations with it are familiar with the facts that this report is really addressed, so that in good time they may see to it that the call of the University does not go unanswered.

JAMES FORD RHODES,
WILLIAM R. THAYER,
WORTHINGTON C. FORD,
HENRY H. EDES,
WILLIAM F. WHARTON,
CHARLES P. GREENOUGH,
OSWALD GARRISON VILLARD.

February 26, 1913.

No. 42

REPORT OF THE COMMITTEE TO VISIT THE ARNOLD ARBORETUM

To the Board of Overseers of Harvard College: —

Your Committee appointed to visit the Arnold Arboretum take pleasure in reporting that they find the work for which this department of the University was established, namely, to increase the knowledge of trees and other woody plants, being satisfactorily and most successfully carried on.

There are three ways in which the Arboretum increases knowledge, — first, through the display of living specimens of those species and varieties of trees and timber which can be grown successfully in the climate of this Commonwealth in a great out-of-doors museum; second, by explorations, by investigations in its laboratories, and by the publications of the results of these investigations; and third, by popular instruction and the publication of bulletins of popular information.

In its museum of living plants, the Arboretum has assembled the largest collection of the hardy trees and shrubs of the northern hemisphere to be found in the United States and one of the most complete in the world. The plants in these collections are well cultivated, conveniently arranged and conspicuously labelled for the inspection and study of the public.

Ever since its foundation, the Arboretum has been active in exploring the forest flora of North America. During the last twenty years it has carried on explorations in other parts of the world, chiefly in eastern Asia, first in Japan and later in Manchuria and Korea, and in northern and western China. Gradually the Arboretum has become one of the most active and successful of all dendrological stations in the number and value of its discoveries and introductions, and in the extent and character of its publications. Through its three expeditions in China, it has obtained magnificent botanical collections which are being distributed to the great botanical museums of the world. The largest number of trees and shrubs ever brought at one time into

the United States came from these expeditions. These, too, have been distributed among botanical gardens, nurseries and private growers in all parts of the United States and in all the countries of Europe. The Arboretum now stands in the front rank of the most useful horticultural and botanical establishments of the world.

The Arboretum is equipped with a library consisting of what your Committee believe to be the largest and most valuable collection of books in any way relating to trees that has yet been made, and with a valuable and rapidly increasing herbarium.

The Arboretum, in its chosen fields, has no superior anywhere, and is an institution in which the University and any Harvard man can properly take pride. It is something more than a department of the University, however, for it is a national institution both in the scope of its work and in the demands which are made on it.

In the contract between the President and Fellows of the University and the City of Boston, the Arboretum is most fortunate, since it cannot be moved from its present site for nearly one thousand years without the consent of both the University and the City, which consent will never be obtained.

The Arboretum is open to the public every day in the year, while the City in return for this privilege, and under its contract, has built and maintains the Arboretum's roads, polices the grounds and assumes the payment of all taxes.

Through its explorations and correspondents the Arboretum has brought into cultivation more trees and shrubs than any other institution or firm in the world during the same period, while it has prepared and issued important publications containing the result of its investigations, and in addition has made numerous contributions to cyclopedias and different periodicals. All this great work has been accomplished in the forty years of its existence.

The President and Fellows furnished the land for the Arboretum from their Bussey Farm, while the Trustees of James Arnold contributed $100,000, of which the income only is available. This $100,000 has been gradually increased until it now amounts to something less than $400,000. The present annual income of the Arboretum endowment is about $17,000, while it costs not less than $50,000 a year to carry it on. This has only been possible by annual contributions by the friends of the Arboretum, principally in Boston and its neighborhood. The labor of obtaining

money each year is a serious drain on the time and energies of the Director, who should be left free to devote himself to the scientific work of his position. Moreover, painful as the thought is, your Committee cannot but consider the future, when there may be a director who would not possess the rare combination, which the present Director has, of scientific knowledge and business ability. That the annual expenses have been so far successfully met is very largely due to the admirable and untiring work of Professor Sargent in securing contributions. He should not have been forced to devote his time to this and his successor or successors should be spared this labor, while it is very unlikely that he or they will have anything approaching the present Director's vigor and success in this field. We of course cannot pretend to be able to help him in other ways, but it has been our pleasure and we have felt it our duty to aid him financially in the management of this most useful, as well as most famous, department of the University. We believe that not less than $1,000,000 should now be added to the endowment of the Arboretum, and, considering its national, even world-wide, scope, we trust that some of the money can be obtained outside of Massachusetts.

But the Arboretum needs land as well as money. Its two hundred and twenty acres are already practically covered by the natural woods, which are one of its most valuable and beautiful features, and by its collections. These collections have increased immensely in the last few years, and they need room for their future great increase. The botanists have only partly explored many extensive regions of the world's surface, and there are some which as yet are almost wholly unknown. It is important that the Arboretum should maintain its reputation as the greatest of all tree museums, and it must be put in a position to extend its usefulness and continue explorations, and it must have room for the additions hereafter to be made for its collections. It must secure therefore additional land before the growth of Boston makes this impossible. The Arboretum should embrace within its limits the land adjoining it on Center Street, between the Jamaica Plain and Center Street gates, and it should be given the money to secure any unimproved land on adjoining streets. Most fortunately, the University has unimproved land, about sixteen acres in extent, between South Street and the Dedham Branch of the New York, New Haven & Hartford Railroad. This is sadly needed by the Arboretum, and could be used at once for the arrange-

ment of two important groups of trees for which there is now no proper or adequate space. The land is admirably suited for this purpose, and we strongly recommend the President and Fellows to give over this land as soon as possible to the Arnold Arboretum.

WILLIAM A. GASTON,
WALTER HUNNEWELL,
CHARLES E. STRATTON,
ABBY A. BRADLEY,
JOHN LOWELL,
JOHN E. THAYER,
FRANK G. WEBSTER,
CHARLES A. STONE,
HERBERT PARKER,
BAYARD THAYER,
WILLIAM C. ENDICOTT.

February 26, 1913.

No. 43

REPORT OF THE COMMITTEE TO VISIT THE CHEMICAL LABORATORY

To the Board of Overseers of Harvard College: —

The annual meeting of the Committee was held this year in the Wolcott Gibbs Memorial Laboratory, thus emphasizing the fact that the movement begun several years ago to give relief to this department of the University has entered upon a new stage. There were present Dr. Warren, Chairman, Messrs. Richardson, Foster, and Pennock of the Committee, and by invitation President Lowell, Dean Sabine, Mr. Wells and Mr. Longfellow, and the following members of the Division of Chemistry, Professors Michael, Richards, Kohler, Raymer, White, Baxter, Henderson, Lamb, and Doctors Forbes and Jones. Many changes have taken place in the organization of this department, owing to death and resignation in recent years. Arthur Michael, recently Professor of Chemistry in Tufts College, has been appointed Professor of Organic Chemistry and gives research in organic chemistry. Elmer Peter Kohler, recently Professor of Chemistry at Bryn Mawr, has been appointed Professor of Chemistry and gives a course in elementary chemistry, another in systematic organic chemistry, and research in the same subject. Arthur Becket Lamb, recently Director of the Havemeyer Laboratory in New York University, was appointed Assistant Professor of Chemistry; he gives another course in elementary chemistry, electro-chemistry, and research in physical chemistry. Grinnell Jones, formerly Associate in Chemistry in the University of Illinois, was appointed Instructor in Chemistry for three years; he gives industrial and analytical chemistry and research in physical chemistry. In the Graduate School of Mining, Assistant Professor Charles Henry White gives metallurgical chemistry, and Assistant Professor George Sharp Raymer gives fire assaying.

The discussions at this meeting centered upon the two buildings which are already completed and two of the group which

it is hoped eventually to have built for the use of the Chemical Department.

The first of the two new buildings which have been completed, namely, the Wolcott Gibbs Memorial Laboratory, in which the Committee met, is intended entirely for research in physical and inorganic chemistry. This object was determined by the original deed of gift. Accordingly it was planned with many small rooms, over 40 in all, some designed for chemical and some for physical work, including balance rooms, dark rooms and other laboratories for special purposes. All the air driven into the building is filtered in order to free it from dust, and the whole building is thermostatted, because constancy of temperature is important in accurate work. Hollow bricks in the walls and double glazing in the sashes aid in maintaining this constancy. There are several piers resting on separate foundations for sensitive instruments. Electrical energy, both alternating and direct, can be used through many outlets. The building is so solidly built and is in a location so quiet and secluded that it provides an unusually satisfactory place for precise physico-chemical work. The moving of apparatus into this building was begun on the first of January, and two weeks later investigations had been already begun. Four weeks afterward everything had assumed a normal condition and work was in full progress.

The Committee to secure funds for the Chemical Laboratories have to report a substantial addition to the funds during the past year, that of the gift of the Honorable T. Jefferson Coolidge, '50, in memory of his son, T. Jefferson Coolidge, Jr., of the Class of 1884. This building, now almost finished, is placed sixty feet to the east of the Wolcott Gibbs Memorial Laboratory, and it will house very comfortably the students in elementary and advanced quantitative analysis, together with research students working under the direction of Assistant Professor Baxter, who is in charge of the quantitative work. In many respects, especially externally, this building resembles the Wolcott Gibbs Laboratory, but it is somewhat smaller and inside is arranged rather for the work of moderately large classes than primarily for research. It contains also a comfortable lecture room for seventy-two auditors, in which the lectures in both quantitative and physical chemistry will be delivered.

These two new Laboratories, while they are thoroughly satisfactory as far as they go, together will accommodate only about one hundred men out of the six or seven hundred who need labora-

tory instruction. The others are still quartered in Boylston and Dane Halls in altogether inadequate accommodations. The situation here, too, may soon be complicated by the placing of additional large boilers in Boylston Hall to heat the new library; if so, the conditions would become well-nigh intolerable.

To accommodate these students, therefore, and provide for the future, the architect in collaboration with Professor Richards has drawn an elaborate plan for future buildings to be arranged systematically on land between Oxford Street and Divinity Avenue, south of the Agassiz and Peabody Museums. It will be possible to put on this land a collection of buildings suitable for immediate needs and making reasonable provision for the future. Of these buildings the most essential is undoubtedly that for the elementary courses in descriptive chemistry and qualitative analysis, for these are now quartered in the worst rooms in the old halls. This building might be planned so as to include at first some of the more advanced courses, which could later be transferred to another building, if the numbers in the elementary courses grew too large for their original accommodation. The plan provides a place for this building just north of the New Lecture Hall on Oxford Street. The President and the Committee believe this building to be the most urgent need of the University.

Next in importance to this building for elementary students comes perhaps a building designed to provide quarters for instruction and research in industrial chemistry, a highly important branch for which Harvard has now no opportunities. This building should contain laboratories for large classes receiving instruction in the general methods of work on a large scale, and also many smaller rooms for individual investigation. The courses in assaying and technical analysis might also be placed in this building; but it probably will not be advantageous to attempt there much instruction of a detailed nature in special manufacturing processes, because these are better learned at the appropriate factories. This building also is an urgent need, but one not quite so insistent as the need for adequate laboratories for the classwork of the elementary students.

The Committee take this opportunity to express the sense of their great loss of one of their number by the death of Dr. Morris Loeb and join with the Chemical Department in the following expression of opinion. The Committee of the Overseers to visit the Chemical Laboratory and the members of the Division of Chemistry wish to put on record their very high respect for Dr.

Loeb's generosity and loyalty, and public-spirited attitude toward the growth of chemistry in Harvard University, and to express their regret at his untimely death.

J. COLLINS WARREN, *Chairman*,
CLIFFORD RICHARDSON,
ELIHU THOMSON,
CHARLES H. W. FOSTER,
JOHN D. PENNOCK,
ALEXANDER FORBES.

FEBRUARY 26, 1913.

No. 44

REPORT OF THE COMMITTEE TO VISIT THE MEDICAL AND DENTAL SCHOOLS

To the Board of Overseers of Harvard College: —

In its report for the year 1912 your Committee called attention to the financial conditions of the Medical School and gave an analysis of the sums necessary for running the Laboratory departments and the Clinical departments respectively, and called attention to the fact that, in view of the rapid expansion of the work of the School and the many complicated problems which this necessarily brought about, the time had arrived for a more careful study of the system under which the annual disbursements of the School were made. These matters were brought to the attention of the Committee by the valuable work of the retiring Dean, Dr. Christian, and the work thus begun was taken up with enthusiasm by the new incumbent, Dr. Bradford, who, during the past year, has devoted much time to a careful analysis of the school finances, some of the results of which are herewith submitted.

The Medical School began the fiscal year on July 1st, 1912, with a total deficit accumulated in the last three years of $31,457.56. This amount has been advanced to the Medical School from the general funds of the University and the interest charges on this account will for this year amount to $1,572. This seems a large sum and, in view of past experience, might be a cause for discouragement were it not for the fact that the past three years have shown a steady and gradual reduction of the annual deficit. Thus in 1909–10 it was $18,588.30; in 1910–11 it was $9,153.79, and in 1911–12 it was $3,715.47. This last year would indeed have shown an actual surplus of $1,200, if a gift of $5,000 which had been promised had been paid before, instead of after, July first.

The Medical School derives its income from three general sources: —

(*a*) Income from students and cash payments from other departments and institutions for sale of heat, light and power from the Medical School plant. This income is available for the general purposes for the School and will amount in 1911–12 to about $79,609.75.

(*b*) Income from funds and gifts available for general use, which will amount this year to $76,944.80.

(*c*) Income from funds and gifts available for restricted uses, which will amount this year to $107,126.79. This category includes special funds and gifts for professorships, fellowships, scholarships, etc. Of this amount only about one-half is available for salaries and maintenance; the expenditure of the other half is restricted and not controlled by the Faculty.

The sums, therefore, at the disposal of the Faculty to meet the annual expenses of the School have been estimated on this basis at $206,896.89. The budget for this year is estimated at $212,161, leaving a deficit of $5,265, which will be more than covered by gifts to the amount of $7,000 which have already been promised for this year.

An analysis of the expenditures of the School shows that they are divided into three classes: — (1) Salaries, $118,975; (2) Appropriations, and services and wages, $32,599; and (3) Cost of maintenance of plant, $60,587. The Faculty has complete control only over the items indicated in number 2, while numbers 1 and 3 are only partially under their control. In the year 1911–12, $25,000 was spent in the power plant under the direction of the Superintendent of Grounds and Buildings, showing a large single item of expense which was quite beyond the control of the Faculty.

When we reflect upon the very complicated character of the various details of a large institution like this, composed of several departments and involving different forms of organization, it is easy to see how difficult a problem would be the keeping track of the expenditure of innumerable special funds and gifts.

Although it is shown by the figures above that many of these funds are not under the control of the Faculty, it seems wise for this Committee again to suggest that the burden of working out the financial problems of the School as they stand today should no longer be placed upon the shoulders of the Dean alone, but that he should be aided in this work by a new officer, whose title might be styled a "business manager," and by whose aid it would be possible for him to put in force such measures of economy in the purchase of supplies and the employment of labor as are now difficult of attainment. Such an officer would, in course of time, become familiar with all the details of the accounts of the Medical School and would enable the Dean's office to keep track of different restricted funds in the Treasurer's account and to insure their application to the purposes designated by the donors. It might here be appropriate to call attention to the

fact that the duties imposed upon the office of Dean today have not been materially changed since the time when this department of the University occupied one small building on North Grove Street, nearly a half-century ago.

An inspection of the various buildings was made by members of the Committee. As a result of this inspection, the Committee would call attention to the condition of the work-table tops in the Chemical Laboratory, a condition which has existed for some time and renders the task of instruction in this department difficult.

The great development of the laboratory departments of medical schools in this country has been a marked feature of the last two decades of progress. Clinical teaching, although greatly elaborated and varied in character and better adapted to the students' needs, has remained upon what might be termed an amateur basis. It is only quite recently that medical teaching bodies have come to the full realization of the fact that clinical instruction must be placed, like laboratory instruction, on an academic basis.

Unless a well-trained body of men are placed in charge of this work, it is not to be expected that this most important part of a medical student's curriculum should receive the intelligent supervision which a modern education demands.

In its last report, your Committee called attention to the need of a large sum of money in order that the clinical departments of the Medical School might be placed on an equal footing with the laboratory departments. Such a sum of money ought to be used for two purposes: First, to pay University salaries to clinical professors who should give a large part of their time to University work. Second, to employ assistants who should devote all their time to teaching and to clinical work and investigation in the laboratories and hospitals for a period of five years. It is particularly important that the clinical departments should have such assistants, each at a salary averaging $2,000 per annum. Fifteen such assistants are needed and each would require $500 per annum in addition to his salary to cover the cost of special apparatus and materials. A group of such assistants would improve materially clinical instruction; such men after five years of service would be equipped for higher academic positions in clinical departments, for positions in research institutions, or for consulting positions in various medical centres.

The Harvard Medical School is now in a position to use effectually such professors and assistants in clinical subjects in con-

nection with its school plant and hospital affiliations. Without them, clinical departments in the Medical School will continue to lag behind the laboratory departments. An additional endowment of $1,500,000 would enable the School to strengthen its teaching staff in the manner indicated.

It will be noticed that although this plan contemplates taking the whole of the clinical teacher's time, it is provided that this time of exclusive service is limited in duration. It is not unreasonable to expect (and experience shows that it is feasible) that a sufficient number of young men are ready and eager to dedicate themselves to such service. While the Committee is in entire sympathy with such a plan so far as the younger members are concerned, it does not feel prepared to approve of a system which would oblige the senior members of the departments to abstain from private practice. Modern methods show that a chief of service can give time to consultation without interference with the duties of his office as a teacher. The ambulatory life of a clinical professor and consultant is no longer an essential part of his career.

The services of a great clinic should be at the disposal of rich and poor alike. It would be for the mutual advantage of these two classes of patients that this should be so. A well organized clinic can be so arranged that both classes should be contributory to the purposes of teaching and the advancement of science.

During the past year the Peter Bent Brigham Hospital, and the Children's Hospital and the Infants' Hospital have all been pushed forward to an advanced stage of completion. The Medical School no longer stands in an isolated spot. The grounds about the School are assuming a new aspect and a portion of the Brigham Hospital has already been opened for patients. These changes, accompanied with the advent of new teachers, have placed the work of the Medical School on a new basis and the scheme of medical education, for which this great plant was intended, seems now about to come to fruition.

The Dental School is now in the fourth year of the occupation of its new building which time has shown to be admirably adapted for its purpose. The last year it occupied the North Grove Street building there was a total enrolment of 64 students; this year the number registered was 197. If this rate of increase should continue, it will soon be necessary to put an addition on to the building.

During the last year in the old building, the total number of teachers in all departments was 59. The total number this year is 114. Many of these teachers live outside the city limits and receive a small sum for their travelling expenses. None of the teachers receive any pay for their services. Although for many years the heads of departments have received no salary, the needs of the School will soon demand that they should receive sufficient pay to enable them to give practically all of their time to the School.

A Teachers' Club has been organized that meets once a month. Its purpose is to harmonize methods of teaching and to improve the quality. A committee appointed two years ago to organize and direct research work has done valuable investigation. This has been made possible through the income of the Harriet N. Lowell Research Fund.

Increased public interest in the care of the teeth has added greatly to the labors of the School. Large numbers of children weekly receive attention, the object being a purely public-spirited one from a hygienic point of view. A clinic was at one time established to take care of the teeth and mouths of the young men and women who are employed during the day at so small a wage as to make it prohibitive for them to come to the day clinic. But this clinic has been abandoned for lack of funds.

The nature of instruction in dentistry requires teaching small groups of men. This, therefore, multiplies greatly the number of teachers. Although the increased number of students has helped the financial condition, it has not kept abreast with the increasing demands of the School.

It will thus be seen that although the School has greatly enlarged its sphere of activity and is prospering so far as the patronage of the student and patient is concerned, it is greatly in need of a proper endowment in order to carry on the work on a thoroughly modern basis.

J. COLLINS WARREN, *Chairman*,
GEORGE B. SHATTUCK,
CHARLES W. ELIOT,
ALEXANDER COCHRANE,
WM. STURGIS BIGELOW,
HENRY H. SPRAGUE,
HENRY SALTONSTALL HOWE,
WILLIAM L. RICHARDSON,
CHARLES P. BRIGGS,
CHARLES H. TWEED.

February 26, 1913.

No. 45

REPORT OF THE COMMITTEE TO VISIT THE BOTANICAL MUSEUM

To the Board of Overseers of Harvard College: —

Your Committee begs leave to report that it has examined the condition of the Botanical Museum and has found it perfectly satisfactory. Although the Museum has no invested funds, it has been able by the gifts of friends to meet all of its running expenses, and it now has in hand enough standing to its credit in the University Treasury to finish the present fiscal year without incurring any indebtedness.

The past year has been distinguished above others by the great number of interesting contributions of material for exhibition purposes and for profitable exchanges.

The Honorary Curator, at the last meeting of the Committee, presented a plan for transferring to a large room in his house the appliances for special research which as used at present in the Museum involve some risk of fire. The new laboratory will enable the Curator to carry on investigations conveniently without imperilling in the slightest degree any of the crowded rooms of the Museum. The transfer will relieve to a great extent the work-tables of the Museum, which can now be employed for the installation of specimens.

Your Committee would welcome any measures by which all of the work now done at the University Museum, which involves the use of gas flames and electric heating, could be withdrawn to some suitable laboratory remote from the main structure. The priceless treasures of the sections devoted to Zoölogy, Botany, Mineralogy, and Geology, ought to be placed beyond any possible danger from fire. When the section to connect the Peabody Museum with the main building is finished, and connection is established throughout, the danger of loss will be proportionally greater. Therefore an earnest effort to arrange for a suitable laboratory for the investigations now carrying peril from fire, should be made as soon as practicable. The removal of the laboratory of Economic Botany is of course only a provisional step in this direction: it

would again find a home with its associated studies when a new and fireproof building is available.

The Honorary Curator reports that the experiments in color photography of the Blaschka glass models have been measurably successful, and that it will be possible to send transparencies made in this way to the Panama-Pacific Exhibition. Beautiful specimens of new methods were shown the Committee.

It is pleasant to note that the relations existing between the Museum and the foreign sources of supply of material continue to be satisfactory. New sources have recently been added, among which ought to be mentioned Rio de Janeiro and Honolulu.

Your Committee desires to express its satisfaction with the very economical management of the Museum.

Respectfully submitted for the Committee,

NATHANIEL C. NASH, *Chairman.*

February 26, 1913.

No. 46

REPORT OF THE COMMITTEE ON ITALIAN, SPANISH, AND ROMANCE PHILOLOGY

To the Board of Overseers of Harvard College: —

ITALIAN

Until the present school year, 1912–13, the number of students electing Italian has not varied very materially, as the following statistics show: Whole number of students electing Italian in 1908–09, 69; 1909–10, 69; 1910–11, 80; 1911–12, 93; the present year, however, there are but forty students in the department of Italian, as follows: twenty-four in Italian 1 (Elementary Italian); four in Italian 2 (XVI–XVII Century Italian); eight in Italian 5 (XIX Century Italian); four in Italian 10 (Dante, Professor Grandgent). Naturally so striking a falling off, compared with that in past years, calls for an explanation, — particularly as the courses given in French and Spanish have not only held their own, but have increased. Careful inquiry would point to the fact that, in the case of Spanish, the increase is due to the idea that the subject is " practical," that is, of commercial utility. There has been of late so much loose talk about " vocational " training that the students have been moved more than ever by utilitarian considerations in their choice of studies. The increased interest in French is a result of the institution of " oral " examinations, whereby the students believe that results somewhat more tangible than hitherto are to be secured. Italian, on the contrary, is exclusively a culture study; and all the culture subjects (particularly the classics and Italian) are said to have been suffering for some time the disastrous effects of two new rules. The first was the requirement of extra pay for any course in excess of the obligatory number. This led to a general excision of the humanities, which are regarded as side issues. The second was the new concentration-distribution scheme. This scheme, under which so many courses are thrown under Group I that some must necessarily suffer, makes it almost impossible for the majority of the students to take Italian at all. Moreover, the " oral " examination diverted great numbers from Italian to French.

The situation in regard to the Dante Course is discouraging. A couple of years ago, it had worked up to unprecedented dimensions, some twenty students pursuing the subject, and now it drops to less than half a dozen. The decline of Italian is regarded as the most deplorable development at the present time in the Department of the Romance Languages. The same blight has fallen upon the Classics, probably for the same reason. Everything seems to conspire against the culture subjects. It seems probable that the whole Division of Modern Languages will shortly take up the Italian question, with a view to making the subject less difficult of access than at present.

This year the Circolo Italiano has shown no signs of life.

SPANISH

Unlike Italian, the statistics for Spanish show a normal steady growth, as set forth by the following figures: Whole number of students in the department in 1908–09, 142; 1909–10, 190; 1910–11, 203; 1911–12, 219; 1912–13, 245. There are six courses given in Spanish this year: Spanish 1 (Elementary Spanish) is elected by one hundred and forty-five students; these students are divided up into sections averaging about twenty-five each; Spanish 2 (XVI and XVII Century Literature) has thirty-three students; Spanish 4 *hf.* (General View of Spanish Literature) has seventeen students; Spanish 3 (Poem of the Cid) has fifteen students; Spanish 7 *hf.* (Spanish composition) has twenty-one students; Spanish 8 *hf.* (Spanish composition, second course) has sixteen students. The Sociedad Española has not been active this year. All the Spanish courses show an encouraging increase, and the instructors speak most encouragingly of the men who elect the higher courses. The Spanish-American course, given last year by Professor Hills of the University of Colorado, the Western Exchange Professor, was hardly expected to retain its place in the curriculum as a permanency. Nevertheless, Professor Ford hopes to have a course in Spanish-American literature.

ROMANCE PHILOLOGY

As regards the courses in Romance Philology, the statistics from year to year show that they preserve quite evenly the tenor of their way, the courses being made to alternate one with another as already described in previous reports by your sub-committee, this proving as satisfactory an arrangement to meet existing conditions as has as yet been devised.

In Comparative Literature 2*a* (Phonetics and Study of Language) there are eleven students enrolled, though not all will take the examination. This is a very interesting class, comprising men from all parts of the United States, one Englishman, and one Hindoo. The apparatus is kept in good condition; is useful in showing the class what the "experimental phoneticians" are doing. It is not, so it is believed by some experts, of great value in obtaining results of very great scientific accuracy.

GEORGE B. SHATTUCK, *Chairman.*
JAMES GEDDES, Jr.,
WILLIAM R. THAYER,
WILLIAM B. DE LAS CASAS.

April 9, 1913.

No. 47.

REPORT OF THE COMMITTEE TO VISIT THE HARVARD DIVINITY SCHOOL.

To the Board of Overseers of Harvard College: —

The Committee appointed to visit the Divinity School has the honor to submit the following report to the Board of Overseers: —

The Committee regards it as a matter of fundamental importance that the Harvard Divinity School should continue to stand, as it has in the past, for the highest scholarship, not only in regard to the attainments required of the students, but also in respect to the reputation of its Faculty, as measured by both teaching efficiency and productive scholarship. The Committee, therefore, views with satisfaction the establishment of the new requirements for the S.T.B. degree, and of the new degree of S.T.M. for advanced study. In the past the books produced by such scholars as Ezra Abbott, J. H. Thayer, C. C. Everett, C. H. Toy, and F. G. Peabody have largely contributed to the reputation of the School. The School is fortunate in possessing to-day a Faculty as learned and accomplished as any group of teachers that has ever been connected with it. Recognizing the necessity of maintaining the School's prestige the Committee heartily approves the policy of encouraging the contributions to theological and biblical research which members of the Faculty are so well qualified to make, even though to achieve this end it may be wise from time to time to relieve one or another member of the Faculty from at least part of the routine of teaching and from time-consuming administrative tasks. Such a policy may not necessarily result in an increase of the number of students drawn to the School, yet there can be small question as to its wisdom if it enables the School to play a potent part in molding the religious thought of the country.

While thus gratefully recognizing and approving every measure for preserving and advancing the School's reputation as a seat of learning, the Committee would urge the importance of remembering that the prime aim of the School is the production of well-trained, efficient, and consecrated ministers. It was

developed and endowed for this purpose. For one hundred year the School has educated a succession of men, who, if never very numerous, have nevertheless performed a highly honorable service to religion. A study of the lists of students during the last half century indicates that, although considerable fluctuations have occurred, the number of men who have taken the S.T.B. degree has remained about the same decade by decade, while there has been a considerable increase in the number of those who have come for special work for one or two years. This latter group has consisted of men who either wanted a year at Harvard Divinity School before entering some denominational school, or who were already graduates of another theological school, but who desired further training for their profession. The presence of a considerable proportion of graduate students increases the opportunity of the School to serve the community by sending out highly trained men, but in the opinion of the Committee it does not justify the School in any diminution of its work for men who do not propose to go beyond the S.T.B. degree. The proportion of men in this latter group who actually enter the ministry is somewhat larger than in the case of men who pursue more advanced studies and who are, therefore, more liable to be drawn off into teaching. So far as these teachers become professors in theological schools the Harvard Divinity School does, indeed, effectively serve the cause of religion, yet it would fail in its main purpose did it not chiefly prepare men for active service in the ministry.

In the past the School has been subject to the criticism of laying too much emphasis upon scholarship, and too little upon the career in which the student's scholarship is to be employed; of turning out theological scholars rather than consecrated ministers, — men who might be learned, but whose fires of enthusiasm for religious service had hardly been kindled; of being, not, perhaps, too intellectual, but certainly of giving too little religious inspiration and practical impetus to its students. The Committee feels that these criticisms are not wholly just, and also that, in a sense, it is impossible to teach religion, or to inculcate enthusiasm for service by precept. But while it is true that religion cannot be taught, it is no less true that it may be inspired, and that enthusiasm for a professional career may be communicated by teachers who are themselves fired with a zeal for the career toward which their pupils are working. The Committee believes that there is no incompatibility between the ideal of an exceptionally learned

and productive theological faculty and the ideal of a Divinity School which shall provide not only well trained, but enthusiastic ministers for the churches; indeed the Committee doubts whether the first ideal can long continue a living one without the vitalization which comes from holding the second ideal also.

In order to provide a more effective training for the active ministry, and to strengthen the professional ideal, which is certainly in some measure lacking, the Committee would urge the desirability of an enlargement of the curriculum. The range of theological teaching is to-day considerably broader than it was twenty-five years ago. At that time the Harvard Divinity School probably provided a curriculum which was adequate in its inclusiveness, and equal to anything to be found elsewhere. During the past quarter century, however, while the range of the theological school curriculum has been enlarging, the Harvard Divinity School has practically stood still, both as regards its resources and the number and variety of the courses offered. Indeed in one notable and conspicuous respect the Harvard Divinity School is weaker than it has been at any time in the last quarter century, viz., in the department of homiletics and pastoral care. The resignation of Professor Peabody leaves the School without any professor in that important subject. So long as Professor Peabody had charge of this work the School could at least make a creditable showing therein, since Dr. Peabody was an unsurpassed teacher of homiletics. At the present time, however, though the excellent lectures given by President Fitch are open to Harvard Divinity students, the only instruction offered by the Harvard Faculty in this subject is such as one or two of its members are able to give in addition to their regular work. The Visiting Committee ventures to point out that it is an undesirable policy to thrust upon Dean Fenn, for example, the burden of the homiletic teaching, even as a temporary expedient, and that President Fitch, greatly as his lectures are appreciated by the students, cannot alone possibly provide an adequate measure of instruction and training in this important department.

A study of the work now being done at other progressive theological schools, notably at Union, Hartford, and Yale, shows the marked trend of the ministry to-day toward specialization, and in particular the increasing emphasis upon instruction in the varied aspects of the social problem; upon the interpretation of the modern tendencies of thought; and upon more thorough training for the practical work of the ministry, viz., religious education,

preaching, and parish administration. At most of these poin the Harvard Divinity School seriously lags behind the schoo mentioned, even when complementary resources both of th University and of the Andover Theological Seminary are cor sidered. The Committee is of the opinion that no reputatio for great learning, or for advanced scholarship in the more learne phases of theological education, will compensate for failure to d efficient work in these newer requirements for ministerial training The ministry to-day is demanding not only men who are learned in the sense in which our fathers used the word, but also men who are experts in the new field of religious education and in the administration of parish affairs, and who are wise guides through the vexatious problems of our modern civilization. The Committee most assuredly does not desire to see any slackening of interest in sound learning, but it would point out with great earnestness that the entire body of instruction given in the School should have as its prime aim the production of vigorous, efficient, and devoted ministers.

The Committee recognizes that it is easier to make these recommendations than to carry them out; that first rate teachers of homiletics and pastoral care are not easily to be found; and that experts in religious education are still few. But the Committee feels that the prime desideratum of the School at the present moment is the appointment of one or more full professors in these subjects, who shall bring their ministerial experience, zeal and enthusiasm to inform and inspire the School. If the resources of the Divinity School do not admit of the immediate appointment of a thoroughly qualified man, or men, to fill such professorships we would urge that a vigorous attempt be made to secure without delay an adequate increase of the income of the School. We believe that there would be a generous response to an appeal for additional endowment, provided it were made clear that the traditional purposes and ideals of the School, — to train well-equipped and devoted men for the active ministry, — are to remain unchanged. The Committee recommends that, until such professor or professors be appointed, the services be secured of one or more competent ministers from Cambridge or Boston who could give the desired instruction in preaching, parish administration, and the relation of the minister to social problems. Indeed the Committee believes that even after the teaching staff at the School has been strengthened along the lines herein mentioned, there would still be advantage in having at least occasional lectures

upon these subjects given by men who are in the active ministry. The coming of such men to a school has the great advantage of bringing a fresh and vitalizing sense of reality to the students, — whose work has always a tendency to become purely academic, — putting them thus in touch with actual life.

HENRY WILDER FOOTE, *Chairman.*
JOHN A. BELLOWS,
JAMES DeNORMANDIE,
PAUL REVERE FROTHINGHAM,
GEORGE A. GORDON,
AUGUSTUS M. LORD,
CHARLES L. NOYES,
CHARLES E. PARK,
FRANCIS H. ROWLEY.

May 14, 1913.

No. 48

REPORT OF THE COMMITTEE TO VISIT THE BUSSEY INSTITUTION

To the Board of Overseers of Harvard College: —

The Bussey Institution has now fully taken its allotted place in the Graduate Schools of Applied Science, both in teaching and in research. Its ability is proved, and its usefulness is recognized. There is a more considerable demand for men who have been taught there than it can supply with its present equipment. It has made valuable contributions to science, and is eager to devote its energies to investigations which promise to throw light on principles of fundamental importance in applied biology.

We have to report that the Bussey Institution has made an admirable record of accomplishment on very slender means. Adequate financial support should now be secured. Certain studies closely related to those pursued should be added to the curriculum, thereby strengthening both the Institution and the research equipment of the University.

The subjects studied at the Bussey are Economic Entomology, and Heredity or Genetics, both of plants and animals. The mere titles of these subjects indicate the change that has taken place in the study of biology. Twenty years ago living things were treated as objects to be described and classified; a comparatively simple task. While such morphological and taxonomic methods have not lost their value, they may be grouped as static. To-day the emphasis has shifted to the living. Biological methods are dynamic. Life is viewed as a process, not as a thing. The living being is a creature of dynamic relations; related to its environment, of whatever nature that may be, inorganic, vegetable, animal, or all three.

Now, while static work was simple and cheap, dynamic work is complicated and must be costly. The objects of study must be studied while alive. Their dynamic relations must be subjected to accurate observation. They must be definitely controlled in various ways for the purposes of experimentation: — that is to say, the experimenter must be able to create and maintain environment for his plants and animals. Not only must he be able to do

these things, but in many experiments, such as those in heredity, the living objects of study must be observed during several successive generations.

It would be a mistake to suppose that the growing complexity and cost of biological research is associated with a diminishing usefulness to man. Precisely the reverse is true. The gain is a gain in knowledge; a perception of principles which underlie processes, — principles which could not be discovered by merely static methods of study, and have only been arrived at by studying life as a process. Furthermore, the study of the life-process has come to include abnormal changes in it: not health only, but disease, is studied dynamically, and light is thrown upon disease-phenomena by those of health, and conversely. The biologic-dynamic conception draws together all living creatures by community of nature.

The problems of agriculture deal with the phenomena of life. Whether the farmer seeks to improve his stock by breeding, to protect his animals and plants from disease or destructive insects, or to modify the physical and chemical conditions of his land, his methods will be in the long run advanced in consequence of advancing knowledge of fundamental biological process. This relation between practice and investigation is the root-idea of the Graduate Schools of Applied Science.

At this point the question may be asked, — how our increasing knowledge of the life-processes can be restricted in its beneficial influence to any chosen department, such as agriculture? The answer is that it cannot be so restricted. It is, in fact, a chief characteristic of the biological sciences that, sooner or later, their development must affect all the interests of mankind. A few instances may be cited.

Recent discoveries prove that certain insects, or insect-like animals, are necessary intermediate hosts and also transmitters of specific infectious diseases, among which are yellow fever, the malarial fevers, and African sleeping sickness, as well as splenetic or " Texas " fever of cattle. The common house-fly is now known to be as dangerous to us as the great carnivora were to prehistoric man, for it is a common carrier of disease-producing organisms. It is matter of special interest to us that the stable fly has been found to be a transmitter of acute infantile paralysis, by a series of experiments carried on by the Bussey Institution, the Harvard Medical School, and the Massachusetts State Board of Health, working together.

The control of the gypsy moth is a problem far from solution; but the most hopeful approach seems to be the biological one. This alien insect finds in New England an environment much more favorable to it than it has in Europe. It may be that the destruction of our coniferous forests, by disturbing the proportion between evergreen and deciduous trees, has created an environment peculiarly favorable to the gypsy moth. Its control should become a conservation problem, to be studied by our economic entomologists and foresters working together, with State and Federal coöperation, in producing conditions unfavorable to this pest. Possibly this problem can be solved only by considerably modifying the character of our permanent forests.

Another instance of the ever-widening applications of biological research is the study of genetics, including heredity. The farmer and gardener have long sought to improve the quality of plants and animals by breeding profitable or interesting varieties. Extraordinary results have been attained by empirical methods; yet exact scientific investigation by experimental testing of hypotheses has within a few years opened up vistas unimagined. Castle's transplantation of the black ovary into the albino female, subsequently mated to an albino and producing three litters of black offspring, is probably a classic experiment. Biffen's success at Cambridge, England, in breeding a wheat immune to rust, is very encouraging. It is among the imagined possibilities of the future that hereditary diseases or weaknesses may be eliminated by exact methods based on the study of biological processes. One of the students of genetics at the Bussey is about to apply his special training to the study of the heredity of cancer, in coöperation with the Harvard Medical School.

We may observe, also, that the social effects of gains in exact knowledge are of great importance. Genetics, for example, precisely studied, must tend to bring about more responsible, more profound, and nobler habits of regarding reproduction. Truth is a spiritual fire. In a great university fitting the young for life, and handing on the torch from generation to generation, such a social and ethical influence is invaluable.

But we have sufficiently expressed our sense of the importance of the work being done at the Bussey, and of its far-reaching influence as a centre of scientific research and a training school for capable teachers, investigators, and specialists. It remains to make specific statements of its needs and to recommend certain additions to the subjects now studied.

The Bussey library is quite inadequate. Books needed by the students and the staff are lacking, and are in many instances not obtainable elsewhere; the files of periodicals are scanty, there is no librarian. An income large enough to buy needed books and journals, and to provide a librarian, is a pressing requirement.

The Institution lacks facilities for publishing the results of its work. We append to this report a partial list of the published researches of the students and members of the staff, during the academic years 1909–10, 1910–11, 1911–12, giving the titles and brief summaries of 128 articles. This will show the activity characterizing the Bussey and is as strong an argument for adequate publication facilities as need be offered.

A proper animal house and an insectary are needed. Many hundreds of small mammals are kept in the basement because there is no proper place for them. It is imperative that they be kept clean and healthy, results hitherto fortunately attained, though under adverse conditions.

There should be a generous research fund.

A moderate number of scholarships, yielding not less than $500 each, assignable to Bussey students, would be of great value. There are none at present. Capable men, having every qualification except independent means, have been lost for lack of such useful foundations. Able men have been saved to science and started on useful careers of investigation by scholarships in other advanced schools doing research work. We regard the need of scholarship endowment as an important one.

A house where meals could be supplied to students and instructors, and containing a common room and a few lodgings, is needed. For the present such a building could probably be rented for a moderate sum.

These are the immediate needs of the Bussey. Its strength and usefulness would be increased by adding three subjects closely connected with those now studied. These are Cytology, Biological Chemistry, and Comparative Pathology.

Cytology, the study of cells, considers these living units, from which all creatures are derived, and of which they are composed, as " the key to all ultimate biological problems."

Biological Chemistry and Physical Chemistry are not less essential to the student of living processes. Chemistry and Physics are divided and subdivided merely for convenience, for all material things are subject to the principles elucidated by them. If special wheats can be produced by exact methods of breeding,

the food values of the new varieties are not less important to know than their productivity. The chemist is needed by the cytologist, and both are needed by the student of Genetics.

Comparative Pathology, including the study of diseases of plants and animals, and investigation of fundamental processes of disease as disturbances of the normal activities of life, is the third subject suggested as intimately related to the Bussey studies. There exists at present, on the George Fabyan foundation in connection with the Medical School, a chair of Comparative Pathology occupied by one of the most distinguished living pathologists. Its development is seriously handicapped because this department has no rural laboratory where the comparative pathologist can conduct his work dynamically. It would be an inestimable advantage to the studies already established and to those which will be added in the future if the experimental part of this department could be transferred, under an arrangement with the Medical School, to the Bussey, where proper facilities could and should be provided for Dr. Smith's work. Such a development of this department would increase its efficiency and its scope, contributing to the solution of problems in Human Medicine, while doing research work in biology essential to the advancement of sound Veterinary Medicine in this country. There is no place in the United States where Comparative Pathology is adequately taught. Some such strengthening and broadening of the working efficiency of this department would make fuller use of the abilities of a remarkable investigator, and would at once raise this branch of the scientific work of the University to the highest level.

Attendance at the Bussey Institution has quadrupled since 1908. It was 15 in 1908–09; 36 in 1909–10; 57 in 1910–11; 38 in 1911–12; and 60 in 1912–13. During this year Professor Castle is also giving a course on Eugenics, open to undergraduates, with an attendance of 139.

The Forestry Department is to move from Cambridge to Forest Hills. The present Bussey building can be made to meet the immediate needs of this department. It will be a distinct advantage to bring the foresters and entomologists together, and especially so where they may profit by their close proximity to the Arboretum, with its living plants, its library, and its dendrological collection. This transfer promises increased efficiency through coöperation.

No attempt was made at the start to secure additional endowment, not because funds were adequate, but because of a conviction that the new Bussey should prove its worth before further means were sought for. Their work during the past four years has been so important and of such high quality as to surprise those thoroughly qualified to judge and to call forth their enthusiastic approval. The Bussey Institution is now unique in quality as well as in purpose. We are convinced that the time has come to speak frankly of the needs of this growing institution, and to urge its claims as a department of the University of proved value and remarkable promise. We have endeavored to set forth these claims without exaggeration, yet with the candid directness our careful consideration of them imposes on us as an obligation on our part both to the Bussey Institution and to the Board of Overseers.

For the Visiting Committee,

CARROLL DUNHAM, *Chairman.*

May 14, 1913.

A partial list of the published researches of the students and members of the staff of the Bussey Institution of Applied Biology of Harvard University, selected from among the papers published during the academic years 1909–10, 1910–11, and 1912–13:—

Brues, C. T. The Parasitic Hymenoptera of the Tertiary of Florissant, Colorado. *Bull. Mus. Comp. Zoöl.*, 55: 1–125, 1 pl., 88 figs. 1910.

An account of the insects belonging to the group of parasitic Hymenoptera found fossil in the miocene shales at Florissant, and catalogue of all known fossil insects of this group.

Brues, C. T. A Preliminary List of the Proctotrypoid Hymenoptera of Washington, with Descriptions of New Species. *Bull. Wisconsin Nat. Hist. Soc.*, 7: 111–122. 1910.

An account of the representatives of a group of parasitic insects collected in the State of Washington.

Brues, C. T. Some Further Remarks on the Systematic Affinities of the Phoridae, with Descriptions of Two North American Species. *Bull. Wisconsin Nat. Hist. Soc.*, 7: 103–108. 1910.

Notes on the relationship of a family of flies.

Brues, C. T. The Insect Pests of Museums. *Proc. Amer. Assoc. Museums*, 3: 33–54, 18 figs. 1910.

A general account of the insect pests which are destructive to museum collections.

Brues, C. T. A Peculiar Type of Phoridae from Natal. *Psyche*, 17: 33–36, 1 fig. 1910.

Description of a new genus of flies.

Brues, C. T. Some Parasitic Hymenoptera from Vera Cruz. *Bull. Amer. Mus. Nat. Hist.*, 28: 77–85, 1 fig. 1910.

Descriptions of new parasitic insects from Vera Cruz, Mexico.

Brues, C. T. Some Notes on the Geological History of the Parasitic Hymenoptera. *Journ. New York Entom. Soc.*, 18: 1–22. 1910.

An account of the probable evolution of the parasitic insects of the Order Hymenoptera.

Brues, C. T. Notes and Descriptions of North American Parasitic Hymenoptera, VIII. *Bull. Wisconsin Nat. Hist. Soc.*, 8: 45–52. 1910.

Descriptions and notes on parasitic insects.

Brues, C. T. A New Species of Telenomus Parasitic on the Eggs of Tussock Moths. *Psyche*, 17: 106–107. 1910.

Description of a new parasitic enemy of the tussock moth which destroys its eggs.

Brues, C. T. A New Pteromalid Parasitic on *Tortrix fumiferana*. *Canadian Entom.*, 42: 259–260. 1910.

Description of a new parasitic enemy of the spruce bud-worm.

Brues, C. T. Notes and Descriptions of North American Parasitic Hymenoptera, IX. *Bull. Wisconsin Nat. Hist. Soc.*, 8: 67–85, 1 plate. 1910.

Descriptions and notes on some parasitic insects.

Brues, C. T. Some New Species of Platygastridae from Brazil. *Broteria. Ser. Zoöl.*, 9: 150–156. 1910.

Descriptions of new species of gall-insect parasites from Brazil.

Brues, C. T. Notes on Some Genera of Ophioninae with toothed femora. *Psyche*, 18: 21–26, 1 plate. 1911.

Notes on the classification of a group of parasitic insects.

Brues, C. T. A New Species of Peripatus from Grenada, with Observations on other Species of the Genus. *Bull. Mus. Comp. Zoöl.*, 54: 305–318, 4 figs., 1 plate. 1911.

Description of a new species of primitive insect-like animal from Grenada.

Brues, C. T. New Diptera of the Family Phoridae from Paraguay. *Ann. Mus. Nat. Hungarici*, 9: 436–442. 1911.

New species of flies from Paraguay.

Brues, C. T. The Phoridae of Formosa. *Ann. Mus. Nat. Hungarici*, 9: 530–559, 19 figs. 1911.

An account of the members of a family of flies found on the Island of Formosa.

Brues, C. T. Blood-sucking Insects as Carriers of Human Diseases. *Proc. Entom. Soc. Washington*, 14: 180–181. 1912.

A note on some conditions associated with the transmission of human diseases by insects.

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No. 49

REPORT OF THE COMMITTEE TO VISIT THE BOTANIC GARDEN

To the Board of Overseers of Harvard College: —

The Overseers' Committee to visit the Botanic Garden held their meeting at the Garden on May 13th. The Botanic Garden is strictly a University Garden and aims to supply the botanical laboratories with material for study. The resources of the Garden are constantly called upon by the teaching staff in botany and our efforts are concentrated on growing such material as the laboratories require. In addition the Garden maintains a representative collection of plants, both in the open and under glass, for the instruction of students and visitors.

The Garden, furthermore, offers its space and equipment to such enterprises as the investigations into the methods of holding insect pests and fungus diseases in check.

Space and material are furnished for studies in practical horticulture, and very recently an effort has been made to afford practical work to the students in the Department of Landscape Architecture. In connection with changes necessitated by the new building of the Gray Herbarium, plans were drawn by the students in the Department of Landscape Architecture which will govern to a large extent the rearrangement of the Garden opposite the Gray Herbarium.

As has been stated above, the Garden is strictly a University Garden, devoting its space and resources to the demands of instructors and students. It is not to be regarded in the light of an ambitious public institution. But even for efficient service in its necessarily limited field it is not sufficiently well supplied with income to meet the ordinary costs of maintenance. Additional income of at least $2000 annually should be provided and in the near future concerted effort should be made to secure additional endowments. The Garden is not duplicating the work of other botanical departments in the University and should be put on a self-supporting basis as soon as possible.

The Director estimates the income of the Botanic Garden for the year 1912–13, including money received for material supplied to the botanical laboratories, at $5100. To this amount may be added a gift of $2000, received early in the year toward current expenses. Expenditures, according to his books, amounted to $5943.33 on May 1, including payroll and bills for June, 1912. In a running account such as that of the Garden the year is concluded on the first day of June, and the bills for June, paid on July 1, are paid for out of the income of the following college year. According to his figures there is $1156.67 to pay the May bills and the University charges. University charges for 1912–13 should not exceed $600. Therefore, there should be on hand to meet the bills for May, $556.67, which amount should be ample, as the average monthly expenses do not exceed $550. The Director hopes that without further assistance from friends, the Garden can finish the year 1912–13 without a deficit. While his figures may seem rather close to a possible danger mark he states that he has estimated the income very conservatively and the debts, for May, very liberally.

The Experiment Station in Cuba, according to the monthly reports of the Superintendent, is in good condition and at the present time the laboratory tests of seedling sugar cane indicate that success has been achieved in the effort to improve the qualities of the sugar cane in Cuba. Mr. E. F. Atkins was unavoidably absent from the meeting, but a letter from him which was read, bears out this statement.

The Committee beg to express their great pleasure at the appearance and condition of the Garden.

Respectfully submitted for the Committee,

NATHANIEL C. NASH, *Chairman.*

May 28, 1913.

No. 50

REPORT OF THE COMMITTEE TO VISIT THE DIVISION OF MATHEMATICS

To the Board of Overseers of Harvard College: —

The last few years show good progress in a number of ways, some of which are common to the whole College, while some are peculiar to our Department.

The change in the admission requirements, by giving more weight to the school work and less to entrance examinations, will gradually improve the system of preparation in mathematics, so that there will be less cramming and repetition, and pupils will acquire a better working knowledge of algebra and geometry, reaching, we hope, in time to trigonometry.

The new limitations on the freedom of choice in electives change the conditions of undergraduate instruction, and our Department has begun betimes to provide for those students who plan to take one course or two courses only, as well as for such as propose to take a larger number.

It is not a simple matter to select the lines of study which will be best for these different classes of students, and it is not surprising but is very encouraging that improvements in the elementary courses are being steadily made to adjust them to new conditions. Other changes are due to modern researches which are modifying the teaching of even elementary subjects by introducing more accurate definitions and more general and fundamental views and methods. That the members of the Department keep in touch with this movement and also with the most advanced ideas on the subject of teaching will be at once recognized by those who watch its progress from year to year and from decade to decade.

The great bulk of the entering Freshmen have not studied logarithms and trigonometry, and to them two full courses are now offered, A and B. Both of these devote the first three months to logarithms and trigonometry; the remaining time is in Course A divided between analytical geometry and the most elementary

calculus. In Course B it is all devoted to analytics. The introduction of some calculus into A is an experiment, but it appears to be a successful one, and B may sometime be so modified in the same way. For those who have learned trigonometry at school Course C is offered. This is devoted to a thorough study of analytical geometry through conic sections and the corresponding solids but does not at present introduce students to the calculus. It has been given substantially as at present for many years and nine-tenths of all the living graduates who took an interest in mathematics at college got their inspiration from Mathematics C. Nevertheless, it would probably be wise to add a little calculus to this course also, so that students who have taken it will start the Sophomore year knowing at least as much of this branch as do those who have taken A. These courses will then do about all that can be done for a man who takes mathematics for only one year and they will at the same time serve as a good preparation for the very satisfactory opportunities that follow.

The Department is next year to lose the great teacher and scholar who has adorned it for thirty-five years and who on the death of Professor Peirce became its head. Professor Byerly has decided to retire while still in his full vigor but he means to give much time to writing on mathematics and his work will continue to reflect lustre on the University.

Before closing we have one important recommendation to make. The increase in the number of students has brought the classes to an unwieldy size. From fifteen to twenty-five is the usual maximum in colleges according to the report of the American Commission of the International Commission on the teaching of mathematics, while some of our sections number sixty or more. We think that about twenty is the right number and believe that some means should be found to divide up the larger courses by having more instructors and more sections. The salaries of mathematical teachers are painfully small and we are told that men of the type required to take charge of such sections can be secured at salaries of from $1200 to $2000 a year. The argument has been advanced that it is better to have the best men teaching large sections than to have small sections and teachers of a lower grade, but we believe that in this particular branch of study it is important to give the student that individual attention which is only possible when the sections are small, and that the inspiration and guidance of the great men of the department can be more

effectively brought to bear through the medium of a staff of subordinates than by personal lectures to large classes of Freshmen and Sophomores. We hope this matter of smaller sections and a larger force of instructors will receive the careful attention of the governing bodies of the College.

WILLIAM L. PUTNAM,
PHILIP STOCKTON,
GEORGE EMLEN ROOSEVELT,
GEORGE V. LEVERETT.

May 28, 1913.

No. 51

REPORT OF THE COMMITTEE TO VISIT THE SCHOOL OF ARCHITECTURE

To the Board of Overseers of Harvard College : —

The Committee to visit the School of Architecture reports that this year there were twenty-six students registered in the graduate school. Of this number nine were advanced special students who are admitted only when they are over twenty-one years of age and have had at least three years' office experience. There are also forty college undergraduates taking some courses given by the Architectural School.

For the last few years an A.B. degree has been required of candidates who enter the architectural course for a degree. In spite of the distinct advantage of having pupils who have that cultivation which an A.B. degree represents there are two inevitable results. First, the number of students applying is small. This is unfortunate. The present twenty-six regular students make a very small school of architecture. Emulation and *esprit de corps* are greater where the numbers are great. It is an advantage to have many advanced pupils setting the pace and many observant beginners eager to overtake or outstrip. The second result is that a school recruited from Bachelors of Arts almost inevitably exhibits little technical skill, as the students have necessarily had but a limited training in expressing themselves by drawing.

It has been the aim of the Architectural School to give a comprehensive training for architects, and in demanding an A.B. degree it was intended to reach those who have had full opportunity for a liberal education, and in due course to graduate architects with some breadth of vision. As the Department possesses all material advantages, and as its building and library and collections are of the very best, it would seem as if a school with such aims could flourish in the shadow of the University if anywhere.

But advanced standards even combined with every material advantage will not necessarily make a school of the first class.

The instruction must continue to be what cannot be found elsewhere. If this is a well established and widely known condition, then the much to be desired increase in numbers will follow.

Still it is obvious that Bachelors of Arts should enter this graduate school with some skill in drawing and with some knowledge of the history of art. Hence the Committee notes with satisfaction that the courses in freehand drawing have lately been amplified and enriched, and some of them are open to undergraduates. At present a young man who wishes to do so may take freehand drawing as one of his courses in each one of his college years. This should be encouraged in every way. The new lecture courses by Mr. Walker which have been established in the College very largely through the efforts of this Committee will also now supply what has been so conspicuously wanting since Professor Norton died. Both drawing and the history of art may properly form a part of the liberal education of any man whether he intends to be an architect or not. Certainly Bachelors of Arts who have availed of such courses would come to the School without the necessity of devoting their time to elementary study during their first years of post-graduate work.

Although very real questions are thus opened, yet your Committee would not feel that there is any substantial cause to abandon the course that has been undertaken and followed thus far. They deprecate any violent change in the requirements of admission. It is hardly more than six years since the Graduate School of Applied Science was established and only four since the Lawrence Scientific School ceased to exist. It is only this year that it has been separated from the College and placed under a distinct Faculty. These changes have been in operation for too short a time to warrant even a preliminary judgment. This Committee believes that the endeavor to form a school of the highest grade should be given a full and complete trial.

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